



## Critical Care Therapy and Respiratory Care Section

Category:	Clinical
Section:	Medicinal Gas Therapy
Title:	Oxygen Therapy Procedure
Policy #:	01
Revised:	02/02

### 1.0 DESCRIPTION

- 1.1 Definition: In an effort to increase the fraction of inspired oxygen concentration ( $\text{FiO}_2$ ) available to a patient, a variety of oxygen delivery devices are employed to administer medical oxygen. The oxygen may be administered with or without humidity.
- 1.2 Indications
  - 1.2.1 Hypoxemia
  - 1.2.2 Increased work of breathing
  - 1.2.3 Increased myocardial work
  - 1.2.4 Pulmonary hypertension
  - 1.2.5 Transport of patients on continuous oxygen therapy who are also being supplied continuous aerosol therapy; use of one of the devices described here eliminates the need for aerosolization during short-term use
- 1.3 Contraindications: No absolute contraindications of oxygen therapy exist when indications are judged to be present. The relative contraindications of oxygen therapy relate to the dangers of hyperoxemia; the goal of oxygen therapy is to achieve adequate tissue oxygenation using the lowest possible  $\text{FiO}_2$ . Although oxygen administration has inherent risks, the dangers of hypoxemia are greater.
  - 1.3.1 In patients with chronic carbon dioxide retention whose stimulus to breathe is a decreased partial pressure of oxygen in arterial blood ( $\text{PaO}_2$ ), oxygen administration may depress respiratory drive.

Careful monitoring of these patients for hypoventilation is required during oxygen therapy.

#### 1.4 Precautions/Hazards/Complications

- 1.4.1 Induced hypoventilation (see 1.3 above)
- 1.4.2 Oxygen toxicity may result from the long-term exposure to partially reduced oxygen products which alter the metabolic function and structure of lung cells. Patients who have received certain chemotherapeutic agents (i.e. bleomycin) may be particularly vulnerable to pulmonary toxicity with resulting fibrosis and/or emphysema. For further information on the effects of oxygen in the presence of potential pulmonary toxins, see 6.5-6.7. REFERENCES.
- 1.4.3 Absorption atelectasis (high  $\text{FiO}_2$ s)
- 1.4.4 Drying of the nasal and pharyngeal mucosa
- 1.4.5 Fire hazard
- 1.4.6 Potentially inadequate flow resulting in a lower  $\text{FiO}_2$  delivery than intended due to a high inspiratory demand or an inappropriate oxygen delivery device
- 1.4.7 Skin irritation from pressure exerted by the device or reactions to the materials of which the device is made
- 1.4.8 Nasal obstruction, especially in infants and children
- 1.4.9 Aspiration of vomitus may be more likely when a mask is in place. Vomitus may occlude the valve of a nonrebreather mask, thus decreasing oxygen delivery.

#### 1.5 Adverse Reactions and Interventions

- 1.5.1 When signs of hypoventilation (decreased level of consciousness in a suspected or known carbon dioxide retainer) are detected during oxygen administration, notify a physician, and obtain an order for arterial blood gas analysis. Confirmation of hypoventilation requires a decrease in the  $\text{FiO}_2$  and reassessment of ventilatory status after a short period of oxygen delivery at the lower  $\text{FiO}_2$ . The decision to continue oxygen administration must be weighed against the physiological effects of hypoxemia on an individual basis.

- 1.5.2 Hyperoxemia (i.e. SpO<sub>2</sub> greater than 98 percent, or PaO<sub>2</sub> greater than 100 torr for an extended period of time) should be attended by an effort to decrease the FiO<sub>2</sub>.

**2.0 EQUIPMENT:** Selection of an appropriate oxygen delivery device must be based on the FiO<sub>2</sub> required to correct hypoxemia, comfort to the patient, and practicality of use. All of the devices listed are available in both adult and pediatric sizes. Choosing an appropriately sized device may help avoid skin irritations and nasal obstruction.

The following chart should be used only as a guideline for titrating the flow of oxygen. As these are low flow oxygen delivery systems (excluding the venturi mask), the exact FiO<sub>2</sub> will be based on the patient's anatomic reservoir and minute ventilation. **When it is important to ensure delivery of all of a patient's inspiratory flow demands, a high flow system (venturi mask or aerosol mask) is more appropriate. See the CCT RCS Procedure "Continuous Aerosol Administration."**

2.1	<u>Oxygen Delivery Device</u>	<u>LPM</u>	<u>FiO<sub>2</sub></u>	<u>Comments</u>
	Nasal cannula	1-6	.24-.44	Approx. 4%/liter flow; FiO <sub>2</sub> decreases as VE increases
	Simple mask	5-8	.35-.55	Approx. 4%/liter flow; minimum flow must be 5 LPM to flush CO <sub>2</sub> from mask
	Venturi mask	Variable*	.24-.50*	*See pkg. insert for precise flow and corresponding FiO <sub>2</sub>
	Partial rebreather	6-10	.50-.70	Flow must be sufficient to keep reservoir bag from deflating upon inspiration
	Nonrebreather	6-10	.70-1.0	Flow must be sufficient to keep reservoir bag from deflating upon inspiration
2.2	Humidifier (if appropriate): Oxygen supplied via a nasal cannula at liter flows less than or equal to 4 LPM need not be humidified.			
2.3	Oxygen flowmeter			

### 3.0 PROCEDURE

- 3.1 Check the physician's order to ensure that a *proper* oxygen order (includes device and flow rate or FiO<sub>2</sub>, and the device is appropriate for the patient) has been written.
- 3.2 Assemble the appropriate supplies.
- 3.3 Introduce yourself and the procedure to the patient.
- 3.4 Assemble the device and connect it to the flowmeter.
- 3.5 Adjust the oxygen flow rate appropriately:
  - 3.5.1 When using a Venturi system, adjust the flow to that rate which corresponds to the Venturi jet device being used. Consult the package insert for further instructions.
  - 3.5.2 When using the partial/non-rebreather system, adjust the flow to that level which maintains an inflated reservoir bag during inspiration. CAUTION: Flow rates in excess of this may increase the expiratory work of breathing.
- 3.6 Place the device on the patient's face. Masks should fit snugly on the face to ensure an adequate FiO<sub>2</sub> delivery.
- 3.7 Assure patient comfort and tolerance of the device. Infants and children may not tolerate masks. Modify the fit as necessary to ensure compliance and adequate oxygenation, or obtain an order for an oxyhood or "blow-by."
- 3.8 For transport of patients on oxygen therapy:
  - 3.8.1 Obtain a transport cylinder; verify its contents.
  - 3.8.2 "Crack" the cylinder valve to blow out accumulated debris.
  - 3.8.3 Use a regulator with pin rods that match the holes drilled in the cylinder yoke. NEVER adapt the pin indexing system for use other than that for which it was designed.
  - 3.8.4 Tighten the regulator onto the cylinder; open the valve one turn and verify the pressure.
  - 3.8.5 Attach the delivery device for transport.

- 3.8.6 Post transport: Return the cylinder to the safe holding area. Mark empty cylinders. Resume oxygen delivery via piped oxygen system.

#### **4.0 POST PROCEDURE**

- 4.1 Monitor the effect of therapy with pulse oximetry and/or blood gas analysis.
- 4.2 Assess the patient for tolerance and appropriateness of therapy per the Patient Assessment Policy at least once per 12 hour shift.
- 4.3 All “continuous” and “prn” oxygen therapy must be verified for proper set up and function.
- 4.4 Change equipment as specified in the CCTRCS Changing of Equipment Policy.

#### **5.0 DOCUMENTATION**

- 5.1 Document the initiation of oxygen therapy, changes in therapy, and the effect and tolerance of therapy.
- 5.2 All “continuous” and “prn” oxygen therapy must be documented at least once per 12 hour shift.
- 5.3 In the 10D MICU, oxygen therapy must be documented on the “Continuous Ventilation Record” in the “Comments” section. All documentation, other than in the 10D MICU, must be entered into the MIS via the “gas therapy” reporting pathway. The following is required documentation:
  - 5.3.1 Usage of therapy (continuous or prn)
  - 5.3.2 Mode of delivery
    - 5.3.2.1 Device
    - 5.3.2.2 FIO2 and/or liter flow
  - 5.3.3 SpO2
  - 5.3.4 Indication

## **6.0 REFERENCES**

- 6.1 Oakes DF. Clinical practitioner's guide to respiratory care. Old Town, ME: Heath Educator Publications, Inc., 1998:144-146.
- 6.2 AARC Clinical Practice Guideline: "Oxygen in the Acute Care Hospital"
- 6.3 AARC Clinical Practice Guideline: "Neonatal and Pediatric Oxygen Delivery"
- 6.4 Gramlich T. Oxygen therapy. In: Barnhart SL, Czervinske MP, Eds. Perinatal and pediatric respiratory care. Philadelphia: WB Saunders Co., 1995.
- 6.5 Kreisman H, Wolke N. Pulmonary toxicity of antineoplastic therapy. In: Perry MC, Ed. The chemotherapy source book. Baltimore: Williams & Wilkins, 1992.
- 6.6 Rosenow EC III, et al. Drug-induced pulmonary disease: an update. Chest 1992;102:239-250.
- 6.7 Twohig KJ, Matthay RA. Pulmonary effects of cytotoxic agents other than bleomycin. Clinics in Chest Medicine 1990;11(1):31-49.

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